

# Center for Biocomplexity Colloquium

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***“Exploiting Nature’s Engineering Paradigms to Optimize  
Materials in a Mechanical World”***

**Thursday January 29, 2008**

**4:00pm**

**127 Hayes-Healy Center**

***\*Tea at 3:30pm in 257 Hurley\****

All life on Earth is water derived, and all living biological materials contain water. Cyclic loading due to weight bearing activities in Earth’s gravitational environment as well as natural forces such as wind induce fluid to flow through biological materials, including live wood, tissue, and soil. Flowing fluid is the medium of life for cells inhabiting Earth’s ecosystems, including human tissue. A major impasse in understanding fluid flow through biological materials is the difficulty in visualizing complex flow fields that result from physiologic or natural activity. During the past decade, great emphasis has been placed on elucidation of load-induced flow through bone tissue, which serves as a model system for a relatively stiff yet porous two-phase material comprising 25% water. The fluid and solid phases of bone exhibit anisotropy at multiple length and time scales. In this talk I will review recent insights into solid-fluid interactions of bone tissue constituents and their role in maintenance of bone in health and disease. I will then show how we use multiscale computational modeling and novel experimental methods to predict, engineer and manufacture tissue and novel materials in the laboratory and in the human body.